

ENGINEERING ESTIMATING

GIAL KAEGI

ENGINEERING ESTIMATING & CONTROL

A&WSI - ORG. 7A770

526-4381

THE ENGINEERING ESTIMATING
PROCESS USED BY BMAC

APPLIES TO

- ALL MILITARY PROGRAMS

RESULTS FROM

- CUSTOMER COMPLAINTS

- GENERAL CHUBB TO L. D. ALFORD, A. M. S. 600

DATA GENERATED

- IS REQUIRED BY PUBLIC LAW 87-653

- FOLLOWS A LOGICAL FLOW AND IS STANDARDIZED

- PROVIDES TRACEABILITY

- IS MATHEMATICALLY CORRECT AND IS SUMMARIZED

- IS LIKED BY THE CUSTOMER

METHOD USED

- THE COMPANY HAS CHOSEN BMAC OPERATING PROCEDURE 8000-11 ***
'ENGINEERING PROPOSAL ESTIMATE', AND D3-11666-1
'USERS GUIDE TO PROPOSAL MANAGEMENT'

*** OP 8000-11 IS NOW INCORPORATED AS SECTION III OF OPERATING PROCEDURE 61

Section III of 61, now 61.1

152-2

*** OP 8000-11 IS NOW INCORPORATED AS SECTION III OF OPERATING PROCEDURE 61.

BHAC was unable to provide the detail supporting the factored rate. From actual planning and support experience on three different programs, test planning hours were said to be based on a 15.4 percent factor developed

(b) Contract F33657-81-C-0242, CDP 1780-034: Proposed misleading statements of the work to be performed.

defective pricing finding was that the task sheets contained incorrect or duplicating effort proposed as factored cost elements. BHAC's rebuttal to the for task direct estimates were challenged during our postaward audit as

(a) Contract F33657-83-C-2008: Task sheet descriptions (3) The following are specific examples of these deficiencies:

followed by the various engineering organizations. Estimate, which covers task sheet preparation, is not being consistently

(2) BHAC Operating Procedure 8000-11, Engineering Proposal experience used as a basis for estimates.

(d) Incomplete or no specific reference to prior estimates;

(c) Inadequate description of the basis for the

(b) Inadequate or no support for detail estimates; (a) Incorrect statements;

includes:

(1) Task sheets prepared by BHAC estimators occasionally

Condition:

1. Task sheets.

153-4

***OP 8000-11 IS NOW INCORPORATED AS SECTION III OF OPERATING PROCEDURE 61

(1) BHAC finance managers should review task sheet descriptions to ensure that task direct work does not duplicate factored cost estimates.

b. Recommendations.

(5) BHAC Operating Procedure 8000-11 is considered adequate guidance; however, engineering personnel must ensure that they follow that

evaluation and negotiation.

posed effort in sufficient and accurate enough detail to permit effective estimating system. Task sheet descriptions must accurately describe the pro-

(4) The above examples illustrate a serious deficiency in BHAC's

was calculated could not be verified to any accounting records.

support the rate. However, the item count and labor hours from which the rate

upon request and after an extended period of time, data was submitted to

required effort. There was no support in the proposal for this rate but,

ering task sheet called for "A rate of 1.62 manhours per item to accomplish the

(d) CCP 498-017, Spares Provisioning Proposal: The engine-

the person making the estimate.

experience referred to in the task sheets was the knowledge and expertise of

requesting the data. We were told that verifiable data was not available. The

experience, "previous OAS/CHI experience," or "similar programs." Upon

Engineering task sheets stated that the estimate was based on "prior

(c) V-22 [interdivisional] work Authorization FSD Proposal:

get, with line

1528

*** OP 8000-11 IS NOW INCORPORATED AS SECTION III OF OPERATING PROCEDURE 61.

SEE SAMPLE CHECKLIST ATTACHED(NOTE) CHECKLIST WAS REVIEWED BY FINANCE,
DET 34/DCAA ON FRIDAY 13 FEBRUARY 1987.

The checklist will be periodically revised and updated and will include:

This checklist will be developed by 2-16-87.

adhered to.

use to insure all the 8000-11 procedures and AF auditing concerns are
The EEC organization will develop an internal checklist for its analyst to

B. EEC Checklist

approval block on CME sheet).

engineering organization making the estimate; approve the estimate (See

EEC analysts will also make sure that the BCS representatives for the

procedures and regulations as Engineering task sheets.

EEC will revise 8000-11 to state that BCS task sheets will follow the same

although this is not explicitly stated.

the same task format, rules and regulations as the Engineering task sheets,

The intent of 8000-11 is that the BCS task sheet will be completed under

Estimate (CME) sheet on how to properly fill out the CME sheet.

OP 8000-11 shows an example of a BCS task sheet and a BCS Computer Work

A. BCS Estimates

FURTHER ACTION BY EEC

RECOMMENDATIONS

RESPONSIBILITY

PAGE 1

Kastl/Kaegi

1.1 BMAC finance managers should review task sheets descriptions to ensure that task direct work does not duplicate factored cost estimates. (p.2)

1.2 BMAC finance managers should selectively review the history cited as being the basis of proposed estimates to ensure that the descriptions are accurate and the history is appropriate for projection purposes. (p.3)

NOTE: OP 8000-11 AS USED HEREIN IS NOW INCORPORATED AS SECTION III OF OPERATING PROCEDURE 61.

CONDITION:

- a) Procedure 8000-11 not consistently followed.
- b) Factored effort direct estimated.
- c) No supporting detail or not verifiable actuals.
- d) "Procedure 8000-11 is considered adequate guidance" (for engineering).

RESPONSE/STATUS:

BMAC will institute the use of a checklist in Engineering Estimating Controls to insure compliance with Procedure 8000-11. Training on revisions to the procedure have been incorporated into Lead Engineers Training and new supervisors training. BMAC Pricing Organization will continue to monitor rationale and history as a part of the cost proposal checklist.

RESPONSE SUBMITTED BY (DATE)	RESPONSE AGREED TO (DATE)	RECOMMENDATION COMPLETE
<i>James P. Kelly</i> 2/13/87		
PRICING & ESTIMATING MANAGER (DATE)	AF REPRESENTATIVE (DATE)	AF REPRESENTATIVE (DATE)
FUNCTIONAL MANAGER (DATE)	DCA REPRESENTATIVE (DATE)	

ENGINEERING PROPOSAL CHECKLIST

Estimate Type: Planning Budget Firm ROM NTE

ENGINEERING ESTIMATE/PROPOSAL NUMBER: _____

- 1. RFE (Request for Estimate) Kickoff Meeting Held: Date: _____
- 2. RFE Releases: Original Date: _____ Revision Date: _____
- 3. EWS (Engineering Work Statement) Due Date: _____ Actual Date: _____
- 4. EWS Approved and Released to Engineering Organizations: Date: _____
- 5. Task Sheets to EEC (Engineering Estimating and Control):
Due Date: _____ Actual Date: _____
- 6. Task Sheet Review and Correction Cycle:

A. Task Sheet Definitions correct as Per EWS/SOW/WBS Date: _____

B. Task Rationale correct and Complete Per OP 61-SEC. III Date: _____

C. Calculations complete and Mathematically correct. Date: _____

D. Acronyms Spelled out If Not on Approved List. Date: _____

E. BCS (Boeing Computer Services) Computer Work Estimate Sheets complete with All Necessary Signatures. Date: _____

7. Estimate Summaries For Finance Pricing Completed. Date: _____

8. Final Engineering Estimate Approvals. Date: _____

9. Estimate Submitted to Finance Pricing. Date: _____

10. Engineering Estimating Analyst Completing Checklist: _____

11. Engineering Proposal Estimate Management Approval: _____

Name _____ Date _____

Name _____ Date _____

Name _____ Date _____

Name _____ Date _____

Name _____ Date _____

Name _____ Date _____

REMARKS:

RECOMMENDATIONS

RESPONSIBILITY PAGE 39

24. Boeing Computer Services (BCS) Costs

Garrison/Kaeqi

24.1 BMAC should furnish adequate support and required explanations for proposed BCS costs, including copies of the MDI report and CWA/Work Order Cross Reference Table when it is the basis of the estimate. (p.43)

Note: OP 8000-11 as used herein is now incorporated as Section III of Operating Procedure 61.

CONDITION:

- a) Task sheets only contained general statements of the effort, but not support or rationale.
- b) MDI report used for estimate but not disclosed.

RESPONSE/STATUS:

Procedure 8000-11 requires rationale for BCS estimates. Compliance to Procedure 8000-11 will be monitored by Engineering Estimating Controls and Finance Pricing and Estimating through the use of the checklist.

This will apply to proposed BCS support

RESPONSE SUBMITTED BY (DATE)
[Signature]
PRICING & ESTIMATING MANAGER (DATE) *5/13/87*

RESPONSE AGREED TO (DATE) RECOMMENDATION COMPLETE
AF REPRESENTATIVE (DATE) AF REPRESENTATIVE (DATE)

FUNCTIONAL MANAGER (DATE) DCAA REPRESENTATIVE (DATE)

ASSET AND OP 8000-11 METHOD PROVIDES

SUMMARIES

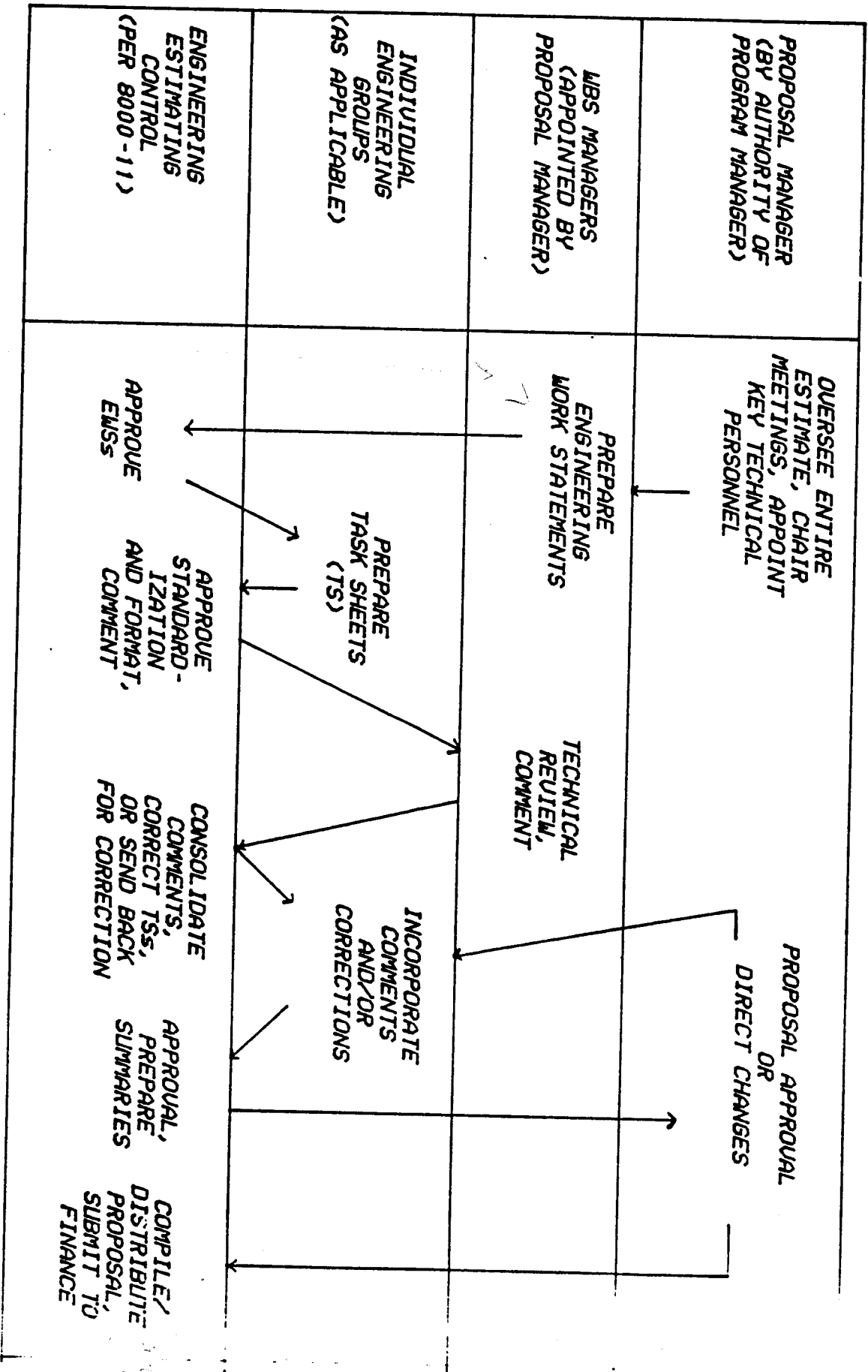
- TASK LEVEL
 - WBS LEVEL
 - ORGANIZATION LEVEL
 - FUNCTION LEVEL
- SPREADS

NOTE: OP 8000-11 IS NOW
 INCORPORATED AS SECTION
 III OF OPERATING
 PROCEDURE 61.

- MANHOURS OR MANMONTHS BY MONTH OR QUARTER
 - ENGINEERING WORK STATEMENTS (EWS)
 - MILESTONES
 - TASKS TRACEABLE TO THE SOW TASKS
- TASK SHEETS
- TASKS TRACEABLE TO EWS TASKS
 - STANDARDIZED FORMAT

*Must have EWS for
 tasks traceable to EWS*

ENGINEERING ESTIMATE (SIMPLIFIED FLOW)



11/1/55

1. PROPOSAL MANAGER - FOCAL POINT DOCUMENT D3-11666-1
 - A. ASSIGNS PRIME ENGINEER
 - B. CHAIRS PROPOSAL TEAM
 - C. ASSIGNS WBS MANAGER FOR EACH MAJOR WBS ELEMENT
2. WBS MANAGER IAW 8000-11 (NOW INCORPORATED AS SECTION III OF OP 61).
 - A. WRITE EMS, OBTAIN REQUIRED REVIEW APPROVAL AND ENSURE ADEQUATE TIMELY DISTRIBUTION THROUGH ENGINEERING ESTIMATING CONTROL
 - B. ENSURE TIMELY RECEIPT OF TASK SHEETS FROM ALL AFFECTED ORGANIZATIONS
 - C. REVIEW TASK SHEETS, AS SCHEDULED BY EEC, TO ENSURE TASK REQUIREMENTS ARE COVERED WITHOUT DUPLICATION AND THAT TASK DEFINITIONS AND RATIONALE IS LOGICAL, COMPLETE AND WILL SUPPORT NEGOTIATIONS
3. EEC IAW 8000-11 (NOW INCORPORATED AS SECTION III OF OP 61).
 - A. REVIEW AND APPROVE EMS PRIOR TO RELEASE AND RELEASE THROUGH RELEASE GROUP
 - B. ENSURE COMPLIANCE WITH THE PROCEDURE
 - C. PREPARE ESTIMATE SUMMARIES REQUIRED BY FINANCE FOR PRICING ENGINEERING LABOR AND MONTHLY SUMMARIES THAT CONTRIBUTE TO EXPENDITURES ANALYSIS OF THE MAGNITUDE OF EACH WBS/TASK IN THE ENGINEERING SUPPORT PACKAGE
 - D. COORDINATE ENGINEERING COST PACKAGE FOR REQUIRED APPROVALS
 - E. COMPLETE ENGINEERING ESTIMATE CHECKLIST AND FORWARD TO FINANCE PRICING WITH COST PACKAGE

WHY WE WRITE TASK SHEETS

DATA REQUIRED BY 'TRUTH IN NEGOTIATIONS ACT' PUBLIC LAW 87-653.

IMPORTANCE OF ESTIMATING PROCEDURES.

TO COMPLY WITH THE REQUIREMENTS, IT IS REQUIRED THAT CONTRACTORS ORGANIZE THEIR ESTIMATING PROCEDURES SO THAT THE FINAL COST ESTIMATE CAN BE READILY TRACED BACK TO THE LOWEST COST LEVEL INPUT ON WHICH IT IS BASED. COST DATA MUST BE FURNISHED SO THAT THE FACTUAL DATA CAN BE IDENTIFIED FROM THE ESTIMATES.

IMPLEMENTATION OF PUBLIC LAW 87-653

PUBLIC LAW PROVIDES THAT A CONTRACTOR MUST SUBMIT EITHER FACTUALLY, OR BY SPECIFIC IDENTIFICATION IN WRITING, COST OR PRICING DATA, AND CERTIFY THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF, THE COST OR PRICING DATA HE HAS SUBMITTED WAS ACCURATE, COMPLETE AND CURRENT.

DEFINITION OF COST OR PRICING DATA - (FAR 15.801)

COST OR PRICING DATA CONSISTS OF ALL THE FACTS EXISTING UP TO THE TIME OF AGREEMENT ON PRICE WHICH PRUDENT BUYERS AND SELLERS WOULD REASONABLY EXPECT TO HAVE A SIGNIFICANT EFFECT ON THE PRICE NEGOTIATIONS.

IN SHORT, COST OR PRICING DATA ARE MORE THAN HISTORICAL ACCOUNTING DATA, THEY CONSIST OF ALL THE FACTS WHICH CAN REASONABLY BE EXPECTED TO CONTRIBUTE TO SOUND ESTIMATES OF FUTURE COSTS, AS WELL AS TO THE VALIDITY OF COSTS ALREADY INCURRED.

WHY WE WRITE TASK SHEETS (Continued)

WHY DATA MUST BE SUBMITTED

THE REGULATIONS PROVIDE THAT THE CONTRACTOR IS EXPECTED TO MAKE DISCLOSURE OF EXISTING VERIFIABLE DATA AND JUDGEMENTAL FACTORS APPLIED IN PROJECTING FROM KNOWN DATA TO THE ESTIMATE, AS WELL AS CONTINGENCIES USED IN THE PROPOSED PRICE. SUCH TERM DOES NOT INCLUDE INFORMATION THAT IS JUDGEMENTAL, BUT DOES INCLUDE THE FACTUAL INFORMATION FROM WHICH A JUDGEMENT IS BASED. IN SHORT, THE CONTRACTOR'S ESTIMATING PROCESS ITSELF NEEDS TO BE DISCLOSED.

AUTHORITY TO REQUIRE COST OR PRICING DATA

WHEN COST OR PRICING DATA ARE NOT REQUIRED TO BE SUBMITTED BY CONTRACTUAL EXCLUSION SUCH DATA MAY NEVERTHELESS BE REQUIRED TO BE SUBMITTED BY THE HEAD OF THE AGENCY IF THE HEAD OF THE AGENCY DETERMINES THAT SUCH DATA ARE NECESSARY FOR THE EVALUATION BY THE AGENCY OF THE REASONABLENESS OF THE PRICE OF THE CONTRACT OR SUBCONTRACT.

YOUR ROLE

SUPERVISION/MANAGEMENT/LEAD ENGINEER

1. CONVEY TO YOUR ORGANIZATION THE IMPORTANCE OF PROVIDING GOOD PROPOSALS AND COMPLYING WITH OPERATING PROCEDURE 8000-11. *****
2. WHEN YOU ARE A PROPOSAL/WBS MANAGER, SELECT THE TASKS AND WRITE THE REQUIREMENTS WITH GREAT CARE.
3. WHEN YOU REVIEW YOUR ORGANIZATION'S TASK SHEETS:
 - A. BE SURE YOU KNOW THE FORMAT AND TECHNICAL WRITING REQUIREMENTS WELL ENOUGH TO ENSURE COMPLIANCE.
 - B. READ THE WORDS AS IF YOU WERE AN AF FINANCE TYPE - -
WOULD YOU UNDERSTAND AND BUY YOUR PRICE?
 - C. CAN YOU PROVE WHAT YOU STATE IN THE TASK RATIONALE?

OP 8000-11 IS NOW INCORPORATED AS SECTION III OF OP 61.

PREPARERS

1. WRITE THE TASK DEFINITION/ESTIMATE RATIONALE FOR AN AF FINANCE TYPE WHO DOESN'T UNDERSTAND WHAT IS REQUIRED TO ACCOMPLISH THE TASK
2. FOLLOW THE FORMAT/TECHNICAL WRITING REQUIREMENTS OF THE PROCEDURE.
3. PUT ALL DESCRIPTION OF YOUR EFFORT UNDER TASK DEFINITION AND BE PRECISE.
4. UNDER ESTIMATE RATIONALE, EXPLAIN AND JUSTIFY EVERY NUMBER IN THE CALCULATION AND THE UNITS FOR EACH.
5. UNDER CALCULATION, USE ONLY NUMBERS/UNITS COVERED BY ESTIMATE RATIONALE AND BE SURE UNITS EQUAL MH.
6. MAKE SURE SPREAD ADDS UP TO TOTAL MANHOURS OR MANMONTHS UNLESS BETA DISTRIBUTION FROM ASSET IS USED.

Wm Hill

*When you start to end a project
ask for the spread
and spread*

TASK REQUIREMENTS OF EMSS

RESPONSIBILITY OF PROPOSAL MANAGER AND WBS MANAGERS.

PREPARE AT HIGHEST SOW LEVEL WHICH IS FEASIBLE AND LOGICAL.

KEEP NUMBER OF TASKS TO A MINIMUM. OMIT SUBTASKS IF POSSIBLE.

DO NOT DEFINE ORGANIZATIONAL EFFORTS

-- PROVIDE REQUIREMENTS AND LET EACH GROUP DEFINE ITS EFFORT ON ITS TASK SHEETS.

-- DEFINE MEETING DURATION AND SUCH THINGS AS NUMBER OF EXPECTED ACTION ITEMS.

ENGINEERING WORK STATEMENT (EWS)

SEPARATE EWS WITH SECTIONS FOR MAJOR WBS ELEMENTS

PART OF CECM/SECTION III OR DISTRIBUTED UNDER SEPARATE COVER

MILESTONES

NUMBERED TASKS

INITIAL EMPHASIS

1. PRECISE FORMAT
2. GOOD TECHNICAL WRITING
3. ADEQUATE TASK DEFINITION/ACCURATE ESTIMATE RATIONALE
4. USE OF QUALIFIED PERSONNEL IN THE ESTIMATING PROCESS

NEXT STEP - -

1. COLLECT SOLID STATISTICAL DATA ON WHAT MH ARE REQUIRED FOR SPECIFIC TASKS.
2. REFINER TASK DEFINITIONS.
3. MAKE USE OF GOOD RATIONALE SECOND NATURE AND GOOD TECHNICAL WRITING A HABIT.

**ENGINEERING
WORK STATEMENT**

BOEING

WBS NO. 6.2.0

TITLE: Configuration Identification

LOT 1

WBS PAGE 1 OF 2

1 CHANGE NO. ECP 999-99

TASK REQUIREMENTS

7

1988												1989												1990												1991											
J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D

WBS MGR. (PHONE: W. Wallat (6-5472)) 6

1 CHANGE NO. ECP 999-99	BOEING	WBS NO. 6.2.0 3	TITLE: Configuration Identification 4	ENGINEERING WORK STATEMENT 7
	LOT 1	TASK REQUIREMENTS (WBS PAGE 2 OF 2)		

TASKS TO BE PERFORMED: 9

Reliability/Maintainability/Supportability (R/M/S) improvements only (new power supply, antenna, etc.) R/M/S improvements plus improved resolution, and modifications for terrain following. Separate volumes are to be developed for Group A and B segments.
b. The Autopilot PIDS will address the following three functions: R/M/S improvements only, R/M/S improvements plus Built-In Test (BIT) capabilities and R/M/S improvements plus modifications for manual/automatic terrain following.

Task 3. Supporting Analyses (SOW 6.2.1.1.2)

Analyses required to support the development of specifications delineated under Task 2. are to be identified and priced under this task. Analyses so identified will be included in proposed amendments to Statement of Work paragraph 6.2.1.1.2.

Task 4. Safety (SOW 6.2.8)

Develop Preliminary Hazard Analyses (PHA) in accordance with MIL-STD-882A, paragraph 5.5.1.1, to assess safety impact of approved configuration changes to the B-52G/H aircraft. PHAs will be conducted at the direction of the customer. For pricing purposes, assume that eight analyses will be conducted, corresponding to the eight Prime Item Development Specifications (PIDS) developed under SOW 6.2.1.1.2.

Task 5. Computer Resources (SOW 6.2.2.2)

Computing support will be required to maintain system specifications and provide configuration identification, control and accounting.

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ORG. NO. 79911 NAME Engineering Preparation

CHANGE ECP 999-99

WBS 6.2.0

PAGE 1 OF 2

EWIS ITEM	TASK DEFINITION AND BASIS FOR ESTIMATE		MH (X) MM ()
1.	Develop Weapon System Design Handbooks (SOW 6.2.1.1.1)		CR ()

TASK DEFINITION:
 An input to the Weapon System Design Handbook will be prepared. This input will define the electrical power quality and quantity of the B-52G and H aircraft. Design criteria for equipment requiring electrical power will be included in this input. A listing of the military specifications that are applicable to the electrical power generation, control and distribution will be compiled for inclusion in the Design handbook. The electrical power input to the System Design Handbook will include sections for the Alternating Current (AC), Direct Current (DC) and the Battery Systems.
ESTIMATE RATIONALE:
 Separate inputs will be made for the A/C and it is estimated that the B-52G will require 20 pages and the B-52H will require 15 pages. On the Offensive Avionics System (OAS) where similar inputs were required, 25 pages were required for Handbook D675-XXXX-1X. The Cost Estimating Relationships Catalog (CER) Page 45, OAS/Cruise Missile Integration (CMI) history as of 7-4-85 lists Weapons System Delivery Manuals, which are similar to Weapon System Design Handbooks, to

PROGRAM TRIPS (IDENTIFY & INCLUDE MH ABOVE)		TOTAL MH
NO. PEOPLE	NO. OF DAYS PER TRIP	TOTAL MM
	TRIP DESTINATION	143.5
	TIME PERIOD OF TRIP (MO. & YR.)	0.9
	PURPOSE OF TRIP	

MO.	MH (X) MM () DISTRIBUTION (DIST)												TOTAL MM					
	1988	1989					1990					1991		1992				
	J	F	M	A	M	J	A	S	O	N	J	D	J	F	M	J	F	M
Disi		0	47	0	62		5	34										
	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J			
Disi																		
MO.	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Disi																		

PREPARED: John Doe

APPROVED: Pete Smith

BOEING MILITARY AIRPLANE COMPANY

ESTIMATE TASK SHEET

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CHANGE ECP 999-99

BUY LOT 1 WBS 6.2.0

DATE 2-5-87 PAGE 2 OF 2

EWS ITEM	TASK DEFINITION AND BASIS FOR ESTIMATE	MH/M CR MM 1
1.	Develop Weapon System Design Handbooks (SOW 6.2.1.1.1) (continued) ESTIMATE RATIONALE: (continued) require 4.1 hours per page. CALCULATION: (20 + 15) pages x 4.1 MH/page =	143.5
	PREVIOUS PAGE SUBTOTAL	0.0
	<input type="checkbox"/> PAGE SUB. <input checked="" type="checkbox"/> TASK TOTAL	143.5

PITCH.TS1

BOEING PROPRIETARY
 POPULATION DATA
 INITIAL DESIGN HOURS
 AVIONICS AND COMPLEX SUPPORT EQUIPMENT MBS

AS OF 07/04/85

CONTRACT	MBS	TITLES	HOURS	DRAWINGS	SHEETS	SQ INCHES	HRS/DWG	HRS/SHT	HRS/SQ IN
CHIFSD	X10	DC POWER MOD	12,431	81	233	215,050	158.4	55.1	.060
CHIFSD	ABDA	CONTROL INDICATOR	481	4	20	4,862	120.3	24.1	.099
CHIFSD	X79	AVIONICS PRIMARY MISSION EQUIP	1,618	14	14	55,352	115.6	115.6	.029
CHIFSD	X82	FACTORY TEST AND SUPPORT EQUIP	9,621	38	51	178,772	253.2	188.6	.054
OASFSO	ABDC	RADAR PRESENTATION CONTROL	4,375	11	43	29,359	397.7	101.7	.149
OASFSO	ABDD	WEAPON CONTROL PANEL	5,530	30	180	150,816	184.3	30.7	.037
OASFSO	ABDE	COMPUTER CONTROL PANEL	7,556	35	284	227,953	215.9	26.6	.033
OASFSO	ABDH	RADAR NAV. NIGHT. PANEL	7,184	36	378	172,601	199.6	19.0	.042
OASFSO	ABEB	RADAR INTERFACE UNIT (RIU)	18,363	36	552	231,319	510.1	33.3	.079
OASFSO	ABEC	EVS INTERFACE UNIT (EIU)	17,183	37	512	246,560	464.4	33.6	.070
OASFSO	ABED	ARMAMENT INTERFACE UNIT (AIU)	16,968	29	279	145,580	585.1	60.8	.117
OASFSO	ABEE	CTD INTERFACE UNIT (CDIU)	17,364	22	291	119,774	789.3	59.7	.145
OASFSO	ABEF	COMMON CORE REMOTE TERMINAL	9,234	5	795	332,957	1,046.7	11.6	.069
OASFSO	ACAB	MISSILE INTERFACE UNITS	23,597	125	1,561	671,050	188.8	15.1	.035
OASFSO	ADBA	CONTROLS & DISPLAYS TEST SET	5,844	18	181	47,405	324.7	32.3	.123
OASFSO	ADBT	OTHER FSIE	30,438	199	1,425	535,568	153.0	21.4	.057
OASFSO	CAAA	AN/ASMN-479 MOD KIT	105,359	306	3,887	1,013,353	344.3	27.1	.104
OASCHI	CAAC	479 TEST ADAPTER GROUP 1	2,919	22	146	54,791	332.7	20.0	.053
OASCHI	CAAE	479 TEST ADAPTER GROUP 3	1,673	23	134	52,641	72.7	12.5	.032
OASCHI	CAAF	479 TEST ADAPTER GROUP 4	1,212	11	63	35,530	110.2	19.2	.034
OASCHI	CAAG	479 TEST ADAPTER GROUP 5	2,088	19	104	43,291	109.9	20.1	.048
OASCHI	CAAH	479 TEST ADAPTER GROUP 6	2,082	25	132	48,340	83.3	15.8	.043
OASCHI	CACD	WEAPONS PRELOAD TESTER	36,251	84	567	225,803	431.6	63.9	.161
OASCHI	CACE	SYSTEMS AVIONICS TESTER	65,720	404	1,515	993,531	162.7	43.4	.066
OASCHI	CACF	STRAY VOLTAGE TESTER	4,251	48	136	89,854	88.6	31.3	.047
OASCHI	CACH	SAFE STATE TESTER	26,022	166	697	377,273	156.8	37.3	.062
SRFSD	AAAB	ANTENNA ELECTRONICS UNIT	33,172	78	1,274	406,632	425.3	26.0	.082
SRFSD	AAAC	TERRAIN DISPLAY CONT PANEL	1,114	9	34	11,501	123.8	32.8	.097
SRFSD	AAAD	RADAR CONTROL/TEST PANEL	7,508	51	378	118,371	147.2	19.9	.063
SRFSD	AAAH	RADAR INTERFACE UNIT MOD	3,799	12	277	64,328	316.6	13.7	.059
SRFSD	AACG	OTHER SITE	20,936	82	527	216,920	255.3	39.7	.097
SRFSD	CAD	AN/ASMN 479 TEST SET MOD	6,241	46	148	76,483	135.7	42.2	.082
SRFSD	CAE	TEST SET GROUP 5 MOD	679	5	21	3,553	135.8	32.3	.141
SRFSD	CAF	TEST SET GROUP 10 MOD	5,204	26	67	47,405	200.2	77.7	.110
SRFSD	CAG	TEST SET GROUP 11 MOD	2,926	15	39	21,599	195.1	75.0	.135
KCRUNIT1	CA	PECULIAR SUPPORT EQUIPMENT	5,845	34	246	170,451	148.4	20.3	.030

BOEING MILITARY AIRPLANE COMPANY

ESTIMATE TASK SHEET

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ORG. NO. 79911 NAME Engineering Preparation

CHANGE ECP 999-99

BUY LOT 1 WBS 6.2.0

PAGE 2 OF 2

EWS ITEM	TASK DEFINITION AND BASIS FOR ESTIMATE	PREVIOUS PAGE SUBTOTAL	
		MH	MM
2.	Develop Prime Item Development Specifications (PIDS) (SOW 6.2.1.1. (continued) ESTIMATE RATIONALE: (continued) CALCULATION: 1 page/document x 2 documents x 6.5 MH/page = 1 page x 6.5 MH/page =	13	0
a.		6	5
b.			
<input type="checkbox"/> PAGE SUB. <input checked="" type="checkbox"/> TASK TOTAL		19	5

PITCH.TS2

ESTIMATE TASK SHEET

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ORG. 79911 NAME Engineering Preparation

CHANGE ECP 999-99

BUY LOT 1 WBS 6.2.0

PAGE 2 OF 3

TASK DEFINITION AND BASIS FOR ESTIMATE

EWS ITEM	TASK DEFINITION AND BASIS FOR ESTIMATE	PREVIOUS PAGE SUBTOTAL	MH(M) MM(M) CR(I)
3.	<p>Supporting Analyses (SOW 6.2.1.1.2) (continued)</p> <p>TASK DEFINITION: (continued)</p> <p>(4) Study configurations and identify Group A requirements.</p> <p>ESTIMATE RATIONALE:</p> <p>Similar analyses have been accomplished on several programs, including CCP 1357 BWP 7531 however, the BMAC labor accounting system does not provide for labor charging to the detail necessary to identify the items of work described herein, therefore these estimates are based on engineering judgement.</p> <p>a.</p> <p>(1) Data Collection for information available at BMAC will require one engineer for two days.</p> <p>(2) The review and analysis of the collected modification data is estimated to require one engineer for one day per Line Replaceable Unit (LRU). Estimate four LRUs to be analyzed.</p> <p>(3) Documentation of Group A impacts is estimated to require two MH for each of the four LRUs.</p> <p>b.</p> <p>(1) Each of two data collection trips (to WR/ALC and OC/ALC) is estimated to require one engineer for three days per trip.</p> <p>(2) Identification of deficiencies and candidate improvements is estimated to require one engineer five days for each of the two FCSS.</p> <p>(3) Prediction of candidate improvements performance is estimated to require two engineers six days each for each of the two FCSS.</p> <p>(4) To study configurations and identify Group A requirements is estimated to require two engineers 10 days each for each of the two FCSS.</p> <p>CALCULATION:</p> <p>a.</p> <p>(1) 1 engineer x 2 days/engineer x 8 MH/day = 16 0</p> <p>(2) 1 engineer 1 day/engineer x 4 LRUs x 8 MH/day = 32 0</p> <p>(3) 4 LRUs x 2 MH/LRU = 8 0</p> <p>b.</p> <p>(1) 2 trips x 1 person/trip x 3 days/person x 8 MH/day = 48 0</p>	0 0	MH(M) MM(M) CR(I)
	<p>M PAGE SUB. <input type="checkbox"/> TASK TOTAL</p>	103 0	PITCH.TS3

ESTIMATE TASK SHEET

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ORG. NO. 79911 ORG. NAME Engineering Preparation CHANGE ECP 999-99 BUY LOT 1 DATE 2-5-87

WBS 6.2.0 PAGE 3 OF 3

EWS ITEM	TASK DEFINITION AND BASIS FOR ESTIMATE	MH/MIN	
		CR1	MM1
3.	Supporting Analyses (SOW 6.2.1.1.2) (continued)		
	CALCULATION: (continued)		
	(2) 1 engineer x 5 days/FCS x 2 FCSS x 8 MH/day/engineer =	80	0
	(3) 2 engineers x 6 days/FCS x 2 FCSS x 8 MH/day/engineer =	192	0
	(4) 2 engineers x 10 days/FCS x 2 FCSS x 8 MH/day/engineer =	320	0
	PREVIOUS PAGE SUBTOTAL	104	0
	TOTAL	696	0

PAGE SUB. TASK TOTAL

PITCH.TS3

BOEING MILITARY AIRPLANE COMPANY
 ORG. NO. 79911
 NAME Engineering Preparation

ESTIMATE TASK SHEET
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 CHANGE ECP 999-99

BUY LOT 1
 WBS 6.2.0
 DATE 2-5-87
 PAGE 2 OF 3

TASK DEFINITION AND BASIS FOR ESTIMATE

PREVIOUS PAGE SUBTOTAL

MHI 1 MM1 1
 CRU

5. Computer Resources (SOW 6.2.2.2) (continued) (3)
 ESTIMATE RATIONALE: (continued)
 Demand Batch CRUS per week and configuration management is estimated to require 500 Demand Batch CRUS per week for 12 weeks.
 c. Wichita Print is estimated to require 20 print CRUS per run at four runs per week for eight weeks plus 50 Wichita Print CRUS per run at one run per week for 11 weeks for configuration management.
 d. system specifications is estimated to require two hours of TSO edit CRUS at 14 CRUS per hour. Configuration management is estimated to require five hours of TSO edit CRUS at 14 CRUS per hour.
 CALCULATION:
 a. (8 weeks x 2 MH/week) + (11 weeks x 5 MH/week) =
 b. (7 weeks x 200 CRUS/week) + (12 weeks x 500 CRUS/week) =
 c. (8 weeks x 4 runs/week x 20 CRUS/run) + (11 weeks x 1 run/week x 50 CRUS/run) =
 d. (2 hours x 14 CRUS/hour) + (5 hours x 14 CRUS/hour) =

71 00
 7400 00
 1190 00
 98 00

[] PAGE SUB- [] TASK TOTAL

PITCH.TS4

NOTE: This is an actual example and does not necessarily respond to previous task sheet examples.

Boeing Military Airplane Co. COMPUTER RESOURCES R K ESTIMATE

Task Sheet File # PITCH.TS4
 BMC CHANGE NO. PROGRAM CODE WBS TITLE
 ECP 999-99 Configuration Identification

DATE 2-5-87 WBS 6.2.0 WBS ITEM 5.

PAGE 1 OF 1
 WBS SUMMARY
 BUY/LOT
 LOT 1

TYPE OF RESOURCE	UNIT	1988				1989				1990				1991				TOTAL
		1	2	3	4	1	2	3	4	1	2	3	4					
Scientific Labor	Hr.	40	40	100	20												200	
Business Labor	Hr.																0	
Schedule Batch	CRU																0	
Demand Batch	CRU	40	40	40	40												160	
Wichita Print	CRU																0	
Wichita TSO	CRU																0	
Wichita On-Line	CRU																0	
Keypunch	Hr.																0	
Four Phase A	Hr.																0	
Four Phase B	Hr.																0	
Gerber Plotter	Hr.	10	10	10	10	10	10	10	10								0	
Calcomp Plotter	Hr.																0	
Versatec Pltr 36	Hr.																0	
Versatec Pltr 11	CRU																0	
Dir CT Verif Pltr	Hr.																0	
M/Fiche Original	Ea.																0	
M/Fiche Dup's	Ea.																0	
Mainstream CTS	\$																4200	
Mainstream EKS	\$	600	600	1000	2000												5000	
VAX 11/780 A	VRU	1000	1000		1000												0	
VAX 11/780 B	VRU					1000	500	500									0	
VAX 11/780 C	VRU																0	

11 signatures reqd. 2-25-87-10519

BCS Analyst J. Smith Org. 5212 Approved J. Jones BMC User J. Doe Org. 7991 Approved A. Brown

FORM 1332 B R1 PITCH.CRI

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Assell

E N G I N E E R I N G E S T I M A T I N G
R E P O R T U T I L I T Y

HP LaserJet - Rev 5.0 - 10 Oct 85
(c) Boeing Computer Services, 1984, 1985

- 1) Report by Function by Organization
- 2) Report by WBS by Task by Org
- 3) Summary by WBS by Task
- 4) Summary by WBS
- 5) Matrix by WBS by Task
- 6) Matrix by WBS
- 7) Matrix by WBS by Function
- 8) Summary by WBS by Function
- 9) ALL OF THE ABOVE
- 10) Return to Operating System

Enter Your Selection:

Note: This is an actual example and does not necessarily correspond to any previous task sheet example.

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ENGINEERING LABOR HOURS ESTIMATE BY FUNCTION BY ORGANIZATION

PAGE 1

CHANGE: ECP 0014 BUY/LOT: PRODUCTION - B-1B SSP COMPANION CHANGE

ORGANIZATION: L-H772 - TEST AND EVALUATION MGR: R. STRIEGEL FUNCTION: ENPGHH

WBS: 1.8.4 - SYSTEM ASSEMBLY, INSTALLATION & CHECKOUT (ON-SITE)

TASK: 02.	LBR HRS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	4704.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	784.0	1568.0
		88											
		1176.0	1176.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		89											
LABOR HRS TOTAL FOR	4704.0	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
WBS: 1.8.4		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	784.0	1568.0
		88											
		1176.0	1176.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		89											
LABOR HRS TOTAL FOR	4704.0	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ORG: L-H772		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	784.0	1568.0
		88											
		1176.0	1176.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		89											
LABOR HRS TOTAL FOR	4868.0	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
GRP: ENPGHH		0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.0	55.0	54.0	784.0	1568.0
		88											
		1176.0	1176.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		89											
LABOR HRS TOTAL FOR	8686.0	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LOT: PRODUCTION		0.0	0.0	0.0	0.0	0.0	0.0	125.0	125.0	110.0	110.0	245.0	270.0
		87											
		364.0	110.0	125.0	110.0	110.0	174.0	140.0	165.0	320.0	319.0	1049.0	1833.0
		88											
		1441.0	1441.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		89											

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19870312 **ENGINEERING LABOR HOURS ESTIMATE BY WBS BY TASK BY ORG** PAGE 1
 CHANGE: ECP 0014 BUY/LOT: DEVELOPMENT - B-18 SSP COMPANION CHANGE

WBS: 1.1.1 - B-18 WST

MGR:

TASK: 01. - REQUIREMENTS COORDINATION

ORG: L-H723	LBR HRS =	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	0.0
LABOR HRS TOTAL FOR	=	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TASK: 01.	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	0.0

TASK: 02. - DRAWING REVISIONS

ORG: L-H721	LBR HRS =	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	84.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.0	0.0	0.0
LABOR HRS TOTAL FOR	=	JAN <td>FEB <td>MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td></td></td>	FEB <td>MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td></td>	MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td>	APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td>	MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td>	JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td>	JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td>	AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td>	SEP <td>OCT <td>NOV <td>DEC</td> </td></td>	OCT <td>NOV <td>DEC</td> </td>	NOV <td>DEC</td>	DEC
TASK: 02.	84.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.0	0.0	0.0
LABOR HRS TOTAL FOR	=	JAN <td>FEB <td>MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td></td></td>	FEB <td>MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td></td>	MAR <td>APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td></td>	APR <td>MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td></td>	MAY <td>JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td></td>	JUN <td>JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td></td>	JUL <td>AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td></td>	AUG <td>SEP <td>OCT <td>NOV <td>DEC</td> </td></td></td>	SEP <td>OCT <td>NOV <td>DEC</td> </td></td>	OCT <td>NOV <td>DEC</td> </td>	NOV <td>DEC</td>	DEC
WBS: 1.1.1	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.0	36.0	0.0

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PAGE 1

CHANGE: ECP 0014

BUY/LOT: DEVELOPMENT - 8-18 SSP COMPANION CHANGE

ENGINEERING LABOR HOURS ESTIMATE MATRIX BY WBS BY TASK

WBS: 1.1.12 - COMPUTER PROGRAM/COMPUTER DATA INTEGRATION

MGR:

ORG	TOTAL TASK 01.	TOTAL TASK 02.	TOTAL TASK 03.	TOTAL TASK 04.	TOTAL TASK 06.	TOTAL TASK 07.	TOTAL TASK 08.	TOTAL TASK 09.	TOTAL WBS 1.1.12
L-H733	-	-	-	-	60.0	-	-	-	60.0
L-H734	-	-	-	-	1550.0	560.0	1080.0	-	3190.0
L-H735	-	-	-	-	-	-	-	160.0	160.0
L-H736	240.0	960.0	304.0	304.0	-	-	-	-	1808.0
TOTAL	240.0	960.0	304.0	304.0	1610.0	560.0	1080.0	160.0	5218.0

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ENGINEERING LABOR HOURS ESTIMATE MATRIX BY WBS

CHANGE: ECP 0014

BUY/LOT: DEVELOPMENT - 8-18 SSP COMPANION CHANGE

PAGE 2

ORG	TOTAL WBS 1.2	TOTAL WBS 1.5.1	TOTAL WBS 1.5.4	TOTAL WBS 1.5.6	TOTAL WBS 1.6.1	TOTAL WBS 1.6.2	TOTAL WBS 1.7.1	TOTAL PROGRAM
3-7111	-	-	-	-	-	-	610.0	610.0
L-11/21	84.0	-	-	-	-	-	-	168.0
L-11/23	36.0	-	-	-	-	-	-	72.0
L-11/31	-	-	-	-	3298.0	-	-	3298.0
L-11/33	-	-	-	-	736.0	-	-	1400.0
L-11/34	-	-	-	-	832.0	1240.0	-	25212.5
L-11/35	-	-	-	-	-	-	80.0	240.0
L-11/36	-	-	-	-	208.0	-	1120.0	12144.3
L-11/37	-	-	-	-	-	-	-	3200.0
L-11/43	-	-	-	-	-	3124.0	-	3124.0
L-11/52	-	-	-	-	-	-	-	7830.0
L-11/54	-	-	-	-	-	2940.0	-	2940.0
L-11/62	-	-	296.0	-	-	-	-	296.0
L-11/72	-	40.0	5834.0	840.0	160.0	-	-	6954.0
TOTAL	120.0	40.0	6130.0	840.0	5234.0	7304.0	1810.0	67488.8

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ENGINEERING LABOR HOURS ESTIMATE SUMMARY BY WBS BY FUNCTION

PAGE 26

CHANGE: ECP 0014

BUY/LOT: DEVELOPMENT - 8-18 SSP COMPANION CHANGE

WBS: 1.6.2

FCT: ENPGMH

ORG: L-H743

LABOR HRS TOTAL FOR	3124.0	87	QUARTER 1	0.0	QUARTER 2	0.0	QUARTER 3	0.0	QUARTER 4	568.0
TASK: 01.		88		852.0	710.0		852.0		142.0	
LABOR HRS TOTAL FOR	3124.0	87	QUARTER 1	0.0	QUARTER 2	0.0	QUARTER 3	0.0	QUARTER 4	568.0
FCT: ENPGMH		88		852.0	710.0		852.0		142.0	

FCT: ENILSH

ORG: L-H754

LABOR HRS TOTAL FOR	2940.0	87	QUARTER 1	0.0	QUARTER 2	0.0	QUARTER 3	568.0	QUARTER 4	692.0
TASK: 16.		88		676.0	628.0		376.0		0.0	
LABOR HRS TOTAL FOR	2940.0	87	QUARTER 1	0.0	QUARTER 2	0.0	QUARTER 3	568.0	QUARTER 4	692.0
FCT: ENILSH		88		676.0	628.0		376.0		0.0	

FCT: ENPGMH

ORG: L-H734

LABOR HRS TOTAL FOR	1240.0	87	QUARTER 1	1240.0	QUARTER 2	0.0	QUARTER 3	0.0	QUARTER 4	0.0
TASK: 17.										
LABOR HRS TOTAL FOR	1240.0	87	QUARTER 1	1240.0	QUARTER 2	0.0	QUARTER 3	0.0	QUARTER 4	0.0
FCT: ENPGMH										

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